

Porter, J., C. Torres, Institute of Ecology, [jporter@uga.edu](mailto:jporter@uga.edu). 2005. Movement of toxic materials through the Vieques marine ecosystem: The effects of naval bombardment on a Puerto Rican coral reef. At: Ecology Society of America's Annual Meeting August 8, 2005. <http://abstracts.co.allenpress.com/pweb/esa2005/document/?ID=48096>

**ABSTRACT-** Land and sea areas on the eastern end of Isla de Vieques, Puerto Rico have been used as a naval gunnery and bombing range since 1943. Viequean coral reefs are littered with leaking and unexploded ordnance (UXO). Radiological, biological, and chemical surveys were conducted to assay the health of these coral reefs. Biotic surveys revealed a statistically significant inverse correlation between the density of military ordnance and several measures of coral reef health, including (a) the number of coral species ( $p = 0.007$ ), (b) the number of coral colonies ( $p = 0.02$ ), and (c) coral species diversity ( $H'$ ) ( $p = 0.0005$ ). Reefs with the highest concentrations of bombs and bomb fragments have the lowest health indices. Water, sediment, and biotic samples revealed that: (a) every animal tested on the seaward reef of Vieques near unexploded ordnance contained at least one potentially toxic compound leaking from in situ ordnance [1,3,5-Trinitrobenzene; 1,3-Dinitrobenzene; 2,4-Dinitrotoluene + 2,6-Dinitrotoluene; 1,3-Dinitrobenzene; 4-Nitrotoluene; 2,4,6-Trinitrotoluene; 2-Nitrotoluene; Hexahydro-1,3,5-Trinitrotriazine]; (b) concentrations of these substances in fish and lobster tested do not exceed EPA's Risk Based Concentrations for commercially edible seafood; but (c) concentrations of these substances in several of the non-commercial species tested (e.g. feather duster worms, corals, and sea urchins) greatly exceed these concentrations. For chromium in sediments, and for TNT in both water and sediment, there is an exponential decline with increasing distance from unexploded ordnance. An organism's mobility and proximity to UXO determine its body burden of toxic compounds: (1) the closer an organism is to a leaking bomb, the higher its body burden will be, and (2) the less mobile (and therefore more sessile) an organism is, the higher the concentration of toxic substances will be. Since the concentration of explosive compounds is highest near unexploded bombs, we recommend that surface UXO on the Vieques coral reef be picked up and removed. We assert that this action will have an immediate, beneficial effect on the coral reef ecosystem by removing these point sources of pollution from the environment.

**Key words:** coral, reef, contaminants, ordnance

All materials copyright The Ecological Society of America (ESA), and may not be used without written permission.